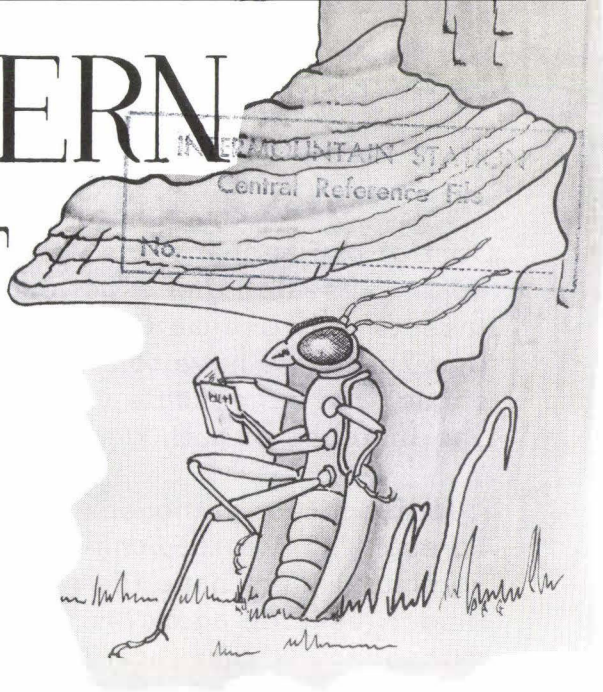
NORTHEASTERN FOREST PEST REPORTER



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FOREWORD

Forest insect and disease activities in the Region have this season been limited mainly to those involving detection and evaluation. The spruce budworm control project in Maine being the one major exception.

The inauguration of statewide aerial detection surveys in Pennsylvania and New Jersey will greatly accelerate that phase of their forest insect program.

Although numerous potential forest insect and disease problems exist the Fiorinia scale of hemlock, the pine leaf aphid, seed and cone insects, the ash dieback and the larch canker problems are currently attracting much attention. This issue of the Reporter will review in more detail some of these more current problems.

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AGRICULTURE — MCELWEE, PHILA., PA.

FOREST INSECT PATHOGENS BANK

Control of forest insects with their own diseases has been a long sought goal. Research and experience today show us that for some of our insects only one major hurdle stands between us and our goal. To clear that hurdle we have to increase the amounts of pathogens so there will be enough for large-scale use in the field, both for testing and for control. The increase of pathogens has been started.

A forest insect pathogens bank has been established at the Southern Forest Pest Control Zone headquarters in Harrisonburg, Virginia. Personnel there have the responsibility of working with states and forest insect research agencies to procure and increase the supply of promising pathogens, to test them in the field, and to stockpile at Harrisonburg, for everyone's use, those proven effective. The common desire for pathogens in quantity has already resulted in several states, federal research agencies, and the Forest Pest Control Zones working smoothly together as a single unit.

Currently the major objective is to increase the supplies of promising pathogens. Facilities have been established at Harrisonburg to handle some of the required insect rearing. Space and equipment needed for intensive testing and for processing quantities of disease-killed insects have also been set up there (Fig. 1). Procurement and initial increases of some pathogens have been accomplished.

Current work is concentrated on the following pathogens:

European pine sawfly polyhedral virus
Virginia pine sawfly (Neodiprion pratti pratti) polyhedral virus
Red-headed pine sawfly polyhedral virus
Linden looper polyhedral virus
Forest Tent Caterpillar polyhedral virus
Fall webworm polyhedral virus and granulosis virus
Fall webworm microsporidian (a protozoon)

- When sufficient quantities of one or more of these pathogens are available for control programs, notification will be given in the Reporter.

Figure 1. A section of the Harrisonburg laboratory showing specialized equipment used in processing insect pathogens.

THE SPRUCE BUDWORM IN MAINE

Aerial spraying to control the spruce budworm (Choristoneura fumiferana) on about 50,000 acres in northern Maine (Aroostook County) began on May 29 and was completed by approximately June 14. Spray dosage and application was the same as used in 1963 (e.g. 1/2 lb. DDT in 1/2 gallon spray solution per acre applied twice). As a special precaution spraying was withheld from within 100 feet of the shoreline on lakes, ponds and streams. Then only a single 1/2 gallon dosage was used for the next 100 feet back. Special care was also taken to avoid flying over or near other critical areas such as poultry and game farms, beehives, and private fish ponds. Owners of these spray sensitive areas had previously been contacted concerning the operation and tree markers were erected to further alert spray or guide plane pilots.

This season, as in 1963, red spruce formed an important component of the stands treated. Since the budworm on red spruce becomes exposed earlier and for a shorter duration than on fir, timing of the initial spray application was critical. Regular larval collections and observations on foliage development made it possible to establish the most effective date for spraying. Fortunately, cold weather prior to spraying helped in prolonging the period of exposure on red spruce. Results of this spray program will be reported in a later issue of the Reporter.

Fiorinia Externa FERRIS, A SCALE INSECT OF HEMLOCK

Although this scale is primarily confined to ornamental eastern hemlock, it could be a serious problem if it were to become established on forest grown hemlock. This scale was first discovered on Long Island about 1910, and is believed to have been imported from the Orient. Fortunately, the scale has not spread very rapidly since its introduction. The primary means of spreading Fiorinia externa is believed to be through infested nursery stock. Currently the University of Maryland is working on the biology and control of this scale.

This armored scale is found on the underside of the hemlock needles (Fig. 2). The female scale is brown and easily seen (Fig. 3). Feeding by the insect causes the needles to turn yellow and fall prematurely. Heavily infested trees take on a white-washed appearance in the spring and fall, which is due to the waxy secretions of the new crawlers. The abundance of crawlers in the spring and fall indicates that there are two generations of the scale each year. Trees with large scale populations have thin, off-color crowns. This scale can kill the tree if it is not controlled.

Eastern hemlock is the prime host of Fiorinia; however, yew, spruce and Douglas-fir will occasionally be infested. The actual distribution of the scale is not known but it has been reported from Connecticut (Meridan and New Haven); Maryland (Baltimore and vicinity); New Jersey; Long Island, New York; Kent, Ohio; Philadelphia, Pennsylvania.

The University of Maryland has achieved excellent control of this scale with drench sprays of dimethoate(Cygon)directed at the underside of the needles.

Selected References

Davidson, J. A. and C. A. McComb, 1958. Notes on the Biology and Control of Fiorinia externa Ferris. Jour. Eco. Entom. 51(3): 405-406.

Kosztarab, M. 1963. The Armored Scale Insects of Ohio (Homoptera: Coccoidea: Diaspididae). Bull. Ohio Bio. Survey n.s. Vol. II, No. 2, pp 81-82.

McComb, C. W. 1963. Fiorinia externa Ferris, A Scale Pest of Hemlock. Univ. of Md., Entom. Dept., Entom. Leaflet No. 17. (Rev.) 1 pp.

Figure 2. Ventral view of hemlock twig showing scales on needles. Dark spots are adult female coverings, white spots are waxy secretions of crawlers. (Photo courtesy of the Entomology Dept., University of Maryland).

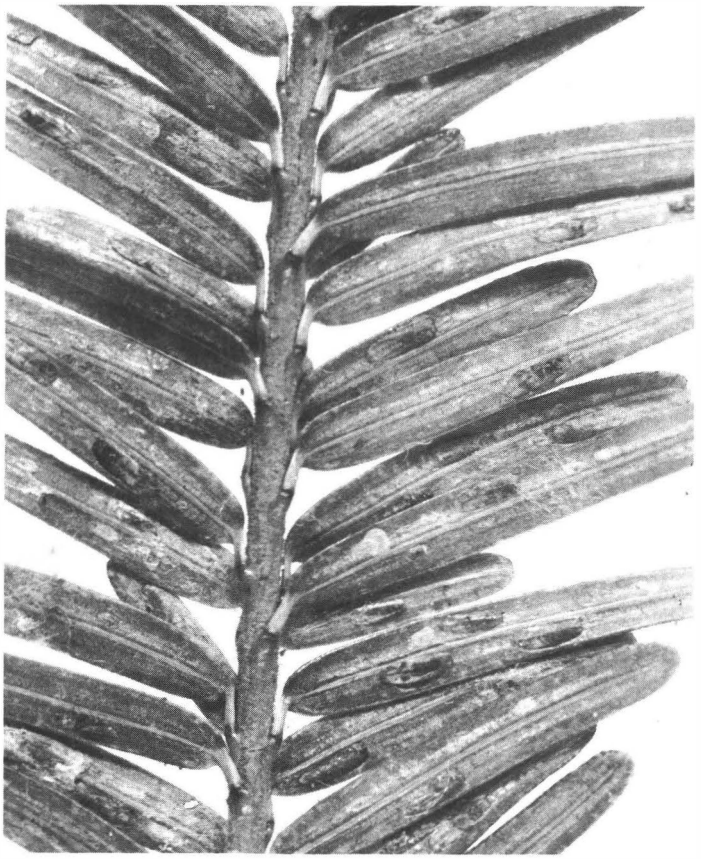


Figure 3. Close-up of scales on underside of hemlock needles. Dark spots are female scales. (Photo courtesy of the Entomology Dept., University of Maryland).

THE PINE LEAF APHID - AN IMPORTANT INSECT PEST OF WHITE PINE

Damage by the pine leaf aphid (Pineus pinifoliae) continues throughout the Northeast. This is especially true in parts of Vermont and New Hampshire. Preliminary control tests in New York using Cygon have been most promising. Generally, chemical control of the pine leaf aphid on eastern white pine is normally possible only during alternate years because of the insect's two year alternate host life cycle. However, a local exception exists in New York where the aphid apparently recycles annually on white pine, thus making it possible to continue these tests annually.

Effective control depends on the proper timing of insecticide application. This is only possible when the aphid's complete life history and habits are thoroughly understood. Intensive studies at the University of Maine and the Northeastern Forest Experiment Station have shown a direct relationship between egg deposition on pine and proximity and density of spruce, the alternate host. Other experiments have indicated that damage to lateral pine twigs decreases as stand closure increases. Additional studies have shown that diameter growth of young white pine is more adversely affected by twig damage than is height growth. A final desired objective of these population studies will be to establish a possible correlation between spruce gall populations and subsequent damage to pine.

PINE ROOT COLLAR WEEVIL IN KENTUCKY

During the fall of 1963, weevil adults were reared from damaged stumps of Scotch pine (Pinus sylvestris) submitted for diagnosis to the Southern Zone office from Booneville, Kentucky. The pines were being grown for Christmas trees.

The insects were identified by Dr. R. E. Warner, of the U. S. National Museum, as the pine root collar weevil, Hylobius radicis Buchanan. This is the first record of this weevil in Kentucky.

A COOPERATIVE LARCH CASEBEARER BIOLOGICAL CONTROL PROGRAM

In the spring of 1964, a biological control program, involving the collection and shipment of an important parasite of the larch casebearer (Coleophora laricella), was undertaken by personnel from the Northern Forest Pest Control Zone, the Maine Forest Service, and the Vermont Department of Forests and Parks. The larch casebearer (Figures 4 and 5), a widespread pest of larch throughout the northeast had recently become established in the western larch forests of northern Idaho, northeastern Washington and northwestern Montana.

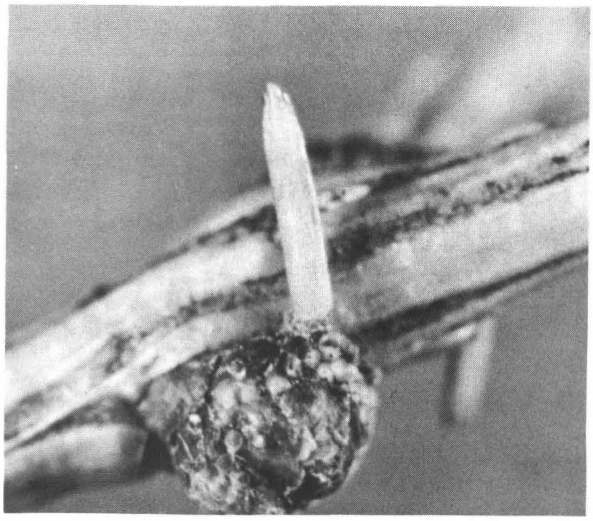


Figure 4. Hollowed out larch needle containing overwintering casebearer larva.

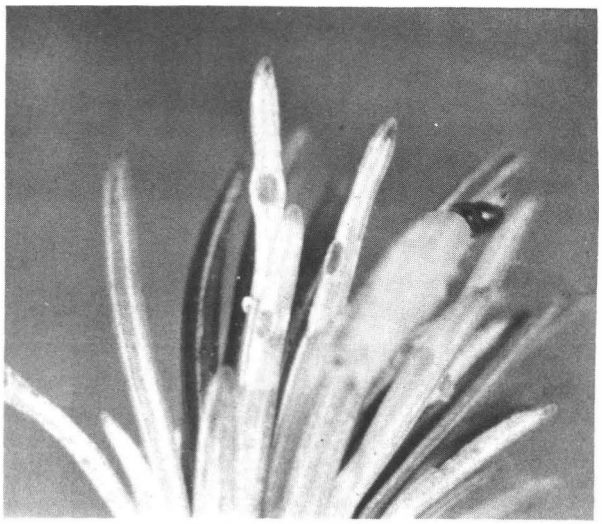


Figure 5. Feeding casebearer larva. Note previously fed upon needles.

Recognizing that if left unchecked this defoliator could spread throughout the range of western larch, western Forest Service entomologists initiated an integrated control program. Both chemical and biological methods were involved.

One of the more promising biological control agents is the introduce braconid parasite, Agathis pumilis. This parasite was already established in our eastern larch stands and had become quite effective in holding casebearer populations in check.

To determine if this parasite could establish and maintain itself in western larch stands a small scale liberation program was carried out in Idaho in 1960. Subsequent recoveries showed that this parasite had adapted itself to this new environment.

During early March (1964), lots of 100 casebearer larvae collected from 6 areas in Maine, 3 in Vermont, and 2 in New Hampshire were airmailed to Montana for determination of parasitism. Parasitism by Agathis ranged from 4 to 78 percent with the highest incidence of Agathis coming from a small larch plantation north of Rutland, Vermont.

Figure 6. Bags of larch twigs contain parasitized larch casebearer larvae ready for shipment to Idaho.

In late March, Forest Service entomologists and Vermont pest control personnel collected and shipped some 12,000 larch twigs containing an estimated 60,000 casebearer larvae from the Rutland area to Coeur d'Alene, Idaho (Fig. 6). The shipment arrived in Coeur d'Alene in good condition two days later.

A mass liberation program by Forest Service entomologists in Coeur d'Alene is now in progress. This will be done with extreme care to eliminate the chance of introducing other insect pests or hyperparasites of Agathis.

A LEAF MINER OF YELLOWPOPLAR

This season the leaf-mining weevil (Odontopus calceatus) again reached outbreak proportions in yellowpoplar over much of eastern Kentucky. The last outbreak was seen in the spring of 1962, when the heavy populations were regarded as a phenomenon that would probably not recur for many years. In 1963, the insect was not reported from Kentucky.

Damage is caused by the larvae mining out large areas or the adults eating many holes in the leaves. Heavily damaged leaves dry up and drop from the trees.

The reported range of the insect is the northeastern United States, Michigan and Florida. In 1963, a single specimen was found in New Jersey.

Because of the high value of yellowpoplar and the uncertainty over the insect's current range and population dynamics, efforts will be renewed to learn more about the insect and its damage. To help in determining the present location of the insect, other than in eastern Kentucky, insect mined or chewed leaves of yellowpoplar should be sent to the Southern Forest Pest Control office for diagnosis.

HEAVY DEFOLIATION OF HARDWOODS REPORTED

Spring defoliators hit hard this year in New Jersey and Pennsylvania. The insects chiefly responsible were the fall cankerworm (Alsophila pometaria) and the oak leaf tier (Croesia semipurpurana).

Both species were found in oaks throughout most of New Jersey, but C. semipurpurana populations were highest in the northern half of the State. Nearly complete defoliation was found in the Kittatinny Mountains (Sussex and Warren Counties), Sourland Mountains (Hunterdon County), and Watchung Mountains (Somerset County).

The fall cankerworm populations in New Jersey were heaviest in the southern part of the State, where they caused heavy to complete defoliation in Monmouth and Ocean Counties.

The fall cankerworm and the oak leaf tier also defoliated vast acreages in north central Pennsylvania. The leaf tier defoliated trees in the red oak group in Cameron, Clinton, Lycoming and Union Counties. In McKean and Potter Counties, the fall cankerworm heavily defoliated black cherry, beech, sugar maple and ash.

COOPERATIVE SEED AND CONE INSECT SURVEY

At the 1963 Annual Forest Tree Nurseryman's Conference in Lowville, New York, concern was expressed over the increasing problem of obtaining an adequate supply of good quality, insect free forest tree seeds.

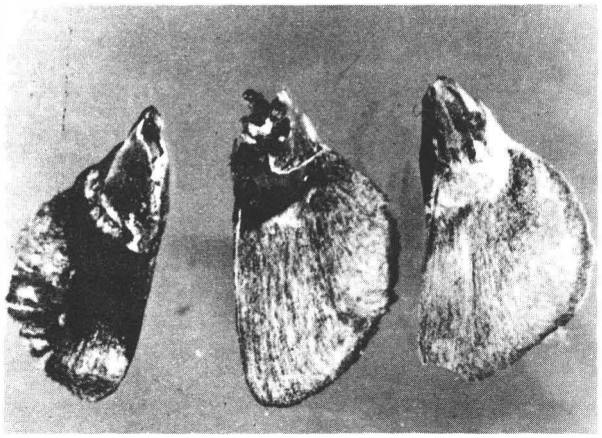
In view of this problem a special survey was initiated by the Northern Forest Pest Control Zone to obtain information on the occurrence, distribution and potential destructiveness of the more important cone and seed insects. Knowledge of these factors will help to place emphasis on those insects most in need of control.

Instructions for collection, preserving, and shipping insect-infested cones have been prepared and distributed to all of the state forest tree producing nurseries throughout the region.

The program was not initiated until well after the 1963 cone collection season had terminated. One Massachusetts nursery, however, had a late collection of insect infested balsam fir cones on hand and submitted several of them for determination. From this initial lot alone, four different insect species were found to have caused such extensive damage that the entire crop of balsam fir seed was deemed worthless (Figures 7 - 10). The primary seed destroyer was a minute seed chalcid, possibly Megastigmus specularis. Second in importance was a seed maggot (Lonchaeidae), followed by a cone maggot (Muscidae) and a cone worm, Dioryctria sp. The habits of these and other destructive insects on balsam fir are now under investigation to determine when control may be most effectively applied. Knowledge gained on the habits and biologies of these insects will be instrumental in the understanding and development of future field tests for control of cone and seed insects attacking other cone species.

Field tests conducted by the Southeastern Forest Experiment Station[1/] showed that slash pines up to 40 feet in total height were protected from coneworm (Dioryctria spp.) attack with BHC (4 lbs. gamma isomer/100 gal. water) or Guthion (1.5 lbs./100 gals. water). Guthion was also effective in controlling the seedworm (Laspeyresia spp.). Application was made by hydraulic sprayer.

1/ Merkel, E. P. 1964. Hydraulic spray application of insecticides for the control of slash pine cone and seed insects. Southeastern Forest Expt. Sta., U. S. Forest Service Research Paper SE-9. 7pp.



A B C

Figure 7. Balsam fir seed infested with: A, Lonchaeid maggot; B, Dioryctria sp.; C, apparently undamaged but infested with Megastigmus sp.

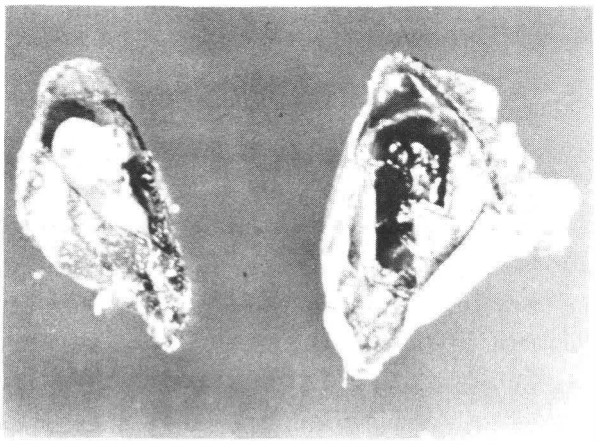


Figure 8. Balsam fir seeds cut away to show pupa and pre-adult of Megastigmus sp.

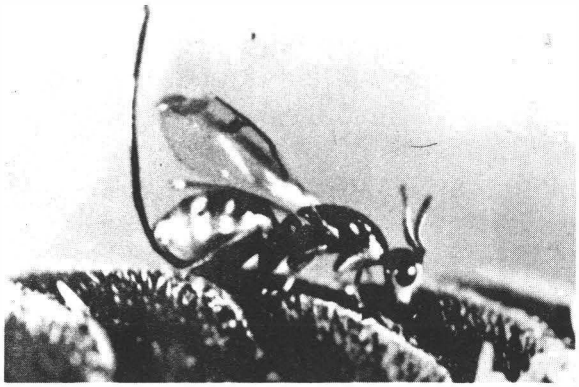


Figure 9. Female Megastigmus searching for oviposition site on balsam fir cone.

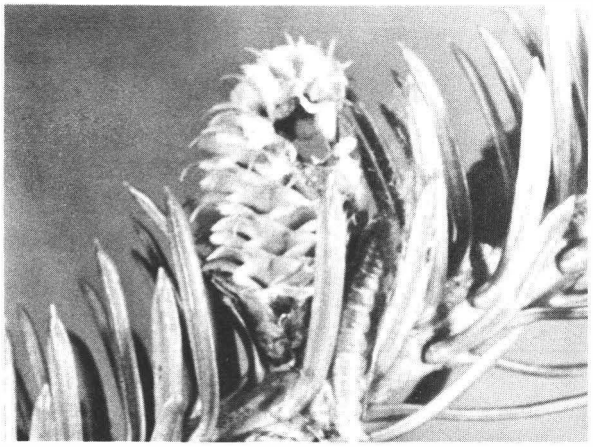


Figure 10. Lepidopterous larva feeding on ovulating balsam fir cone. This larva destroyed 3 cones prior to pupation.

AERIAL SURVEYS

This spring, both New Jersey and Pennsylvania initiated aerial surveys for the detection of insect damage. In New Jersey, two men flew the entire state and sketch mapped damage in forty hours; ground checks disclosed insects responsible. In Pennsylvania, a start was made in training District Foresters to fly and sketch map their own districts. The aerial surveys in both States resulted in locating and delineating very large areas heavily attacked by spring defoliators.

Before any flying started, it became obvious that there was a shortage of personnel in the Region qualified to teach others how to plan and conduct aerial surveys. To remedy this an aerial survey training course was conducted at the Shenandoah Valley Airport near Harrisonburg, Virginia, on June 1 - 3. Instructors for the session were Messrs. R. C. Heller and R. C. Aldrich of the Beltsville Forest Insect Laboratory.

The major objective of the course was to train specialists in the techniques for planning and conducting aerial surveys, employing either aerial sketch mapping or the operation recorder. These persons in turn would train others in these techniques. A secondary objective was demonstrating the appearance, from the air, of different types of forest insect damage. Each trainee also gained flying experience in two types of aircraft - the Cessna 180 and the twin-engine Aero Commander.

Happily, Messrs. Aldrich and Heller succeeded in breaking the long dry spell in the Shenandoah Valley. After one and one-half days of rain, the weather finally cleared for flying on the third and final day of the session.

The States of New Jersey, New York, Pennsylvania, Virginia and West Virginia were represented at the training session. Also attending were personnel from the Northern and Southern Forest Pest Control Zones. In all, 17 individuals received training.

The Region 7 Cessna 180 and the Beltsville twin-engine Aero Commander were used for observation during this session. A hardwood area defoliated by the looper, Phigalia titea, near Mt. Jackson, Virginia, was used for aerial sketch mapping. The operation recorder was used to estimate southern pine beetle activity in Powhatan County in eastern Virginia.

FOMES ANNOSUS CONTROL - A SPECIAL FIELD TEST

A special field test to determine the effectiveness of Creosote, Urea and Borate in preventing the invasion and development of Fomes annosus on freshly cut pine stump is underway on the Dry River Ranger District of the George Washington National Forest. This test is under the supervision of the Southern Forest Pest Control Zone Pathologist.

The test area is a mixed red and pitch (Pinus resinosa and P. rigida) pine plantation approximately 28 years old and, due to its being unthinned, somewhat stagnated in growth. To increase the natural Fomes inoculum several (35-40) large pieces of pine slash from another area, each having one or more mature Fomes annosus sporophores attached, were placed systematically throughout the test area.

In carrying out the test fresh pine stump, 11 to 14 inches high, were treated in the following manner:

Chemical (Treatment)	Mode of Application	No. Stumps Treated/gal.
Creosote (98% wood preservative meeting Federal specifications TT-C-655)	Brush	100 ±
Urea (46% nitrogen)	Back-pack sprayer	50
Borate-Tetra (ACS grade)	" " "	50
Control	None	None

Slightly more than 300 stumps were used for each treatment. Each stump was treated immediately after the tree was felled.

The first check on this test will be 8 months after treatment. Subsequent checks will be made at yearly intervals until 1969 when this test will be discontinued. Sporophore development on stumps will be the criterion for determining if Fomes annosus has or has not become established.

ASH DIEBACK SURVEY COMPLETED

The Ash Dieback Survey, conducted in cooperation with the Northeastern Forest Experiment Station, started on June 10 and was completed on September 10, 1963. Two-hundred and one randomly selected forest survey plots containing one or more ash trees were examined in Pennsylvania, New Jersey, Connecticut, Massachusetts, Vermont, and New Hampshire. Data taken on plots in addition to tree condition included soil drainage, texture, depth to bedrock, plot elevation, exposure and topography. All hardwoods on the plots 2" DBH and over were measured and assigned to dieback classes according to foliar symptoms (Fig. 11). Ash was classified separately from the other hardwoods.

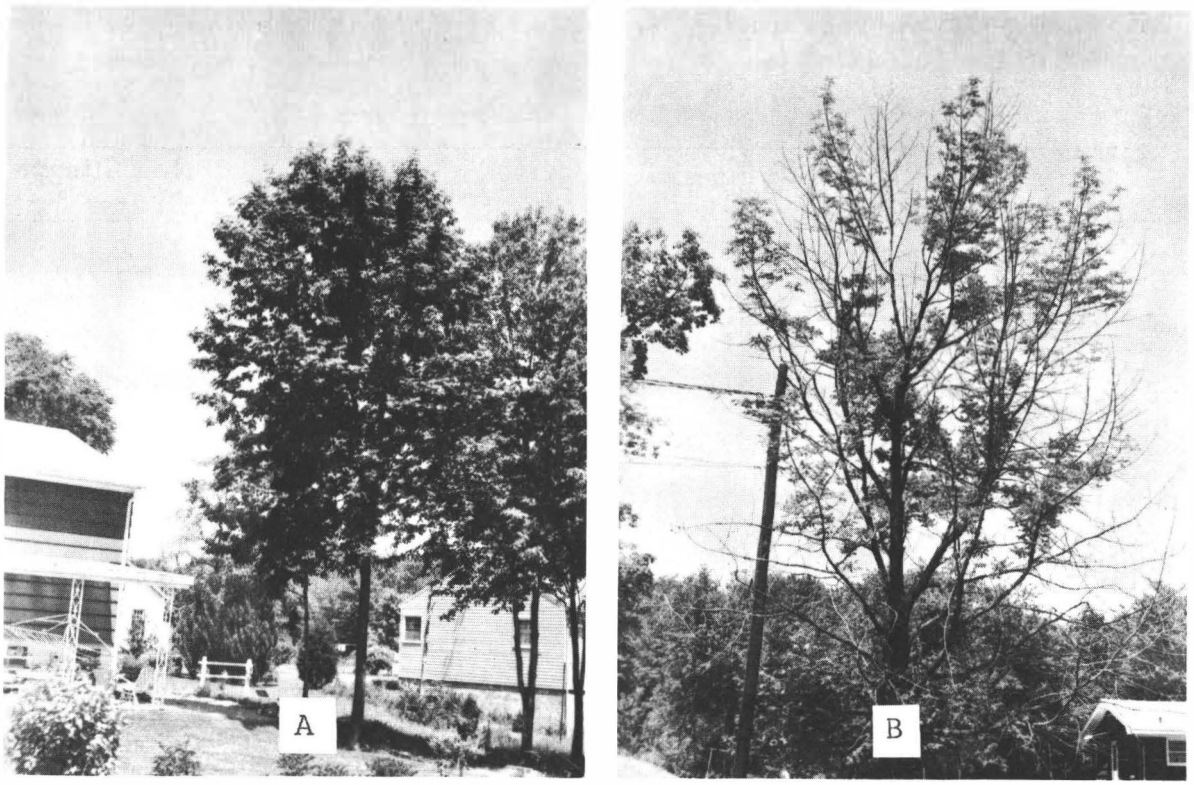


Figure 11. Two of the 5 dieback symptom classes used in survey: A, Class 1 - trees healthy with dark green leaves, no dead bare twigs; B, Class 4 - Branches dying back, more than 50% of crown dead, epicormic branching may be present, leaves clumped and leaflets dwarfed, foliage pale green, cankers sometimes visible on branches and stem.

Analysis revealed no correlation between any site conditions and the disease. The data were, therefore, classified as to percentages infected within the various disease symptom classes by species for each state. Figures for ash were held separate from those for the other hardwoods. Results indicated that ash dieback was present in all the states surveyed but, at least at present, to a lesser degree than in New York State.

Pennsylvania had the highest percentage of dying and dead ash on the surveyed plots (33.4%), with New Hampshire second (27.3%), followed by Vermont (24.6%), Connecticut (19.4%), New Jersey (13.7%), and Massachusetts (12.2%).

The following figures, while not giving a complete picture of the findings, illustrate that our hardwoods seem to be in a period of general decline. In Pennsylvania we found that 21.3% of the sugar maple and 24% of the red maple on the plots were dying or dead. In New Jersey, 43.5% of the red and white oaks on the plots were dying or dead. Thirty-two percent of the birch in Vermont was in the dying and dead class.

It must be realized that the above percentages were arrived at by classifying trees other than ash with the criteria set for the judging of ash dieback. Since the syndrome of the decline of other hardwoods is not as well investigated and recognized as that of ash dieback it must be understood that the findings for the species other than ash might not be quite the true picture. We believe, however, that there is no question that a general hardwood decline is in progress and that the cause has yet to be determined.

LARCH CANKER SURVEY CONTINUING

The history of larch canker infection, caused by the fungus Trichoscyphella (Dasyscypha) willkommii, in northeastern Massachusetts goes back to 1904. At that time the owners of several large estates ordered planting stock from Scotland. Among the various species ordered and planted were a number of species of larch, mainly European and Japanese. About 1926 part of one of the estates was given to Harvard University. When this land was examined by members of the Forestry School faculty, heavy cankering of the larch was noted and the Forest Service was informed. The causal organism was identified and an immediate eradication program started. Every larch within 2 1/2 miles of the Black Brook plantations, Hamilton, Massachusetts, was examined and if found to be infected, destroyed by burning.

The last previous survey was done during the winter of 1952-53. Some 3800 larch trees were climbed and carefully examined for evidence of the fungus. At that time 6 trees were found infected.

On February 1, 1964, this survey was repeated in Hamilton, Massachusetts, where the canker had been found in the past. The survey was terminated on May 1, 1964, due to development of the foliage which prevented clear viewing of twigs and branches. At that time 1589 trees had been examined. This number is approximately 42% of the number of trees examined during the 1952-53 survey. To date no evidence of larch canker has been found. All specimens submitted to Northeastern Forest Experiment Station, New Haven Insect and Disease Research Laboratory, were identified as either Cytospora, Phomopsis or mechanical damage.

Techniques had to be worked out for climbing these trees as some of them are now 90 feet tall with as much as 40 feet of branch-free trunk. Interlocking window cleaner ladders in ten foot sections were found to be extremely useful. As many as five of these could be set up by building one atop the other and the fifth one was just as stable as the first. Each section was chained to the trunk of the tree. The man setting up the ladders had to have both hands free and was, therefore, equipped with a lineman's safety belt. This technique worked very well. Now that all techniques have been worked out it is anticipated that the survey will be completed after needle fall in November and December 1964.

OAK WILT CONTROL - A CONTINUING PROBLEM

Oak wilt (Ceratocystis fagacearum) control continues to be a major forest disease problem in the region. One of the big headaches is that of obtaining qualified aerial observers for the detection surveys. However, gratifying progress in this field is being made in all states concerned.

Currently control operations are underway in Pennsylvania, Virginia and West Virginia. Kentucky is conducting detection surveys on a sampling basis to maintain record of oak wilt spread and intensification. Early surveys indicate that this may be a heavy infection year.

Evaluation of the different control methods now in use is being continued. All old study plots are to be reexamined annually during the next three years. Additional new plots in treated infection centers and in untreated centers will be established to aid in this evaluation. State crews will assist in this work in Pennsylvania and West Virginia.

WHITE PINE BLISTER RUST INFECTION LIGHT THIS SEASON

White pine blister rust infection on ribes reported to be very light throughout the region. This may have been due in part to drought conditions that have been prevalent during May and June.